

REMARKS

The claim objections

In paragraph 2 of the Office Action, claims 8 – 11 and 13 – 16 are objected to under 37 CFR 1.75(c) as being in improper form regarding claim dependency. The Examiner is respectfully requested to note that a preliminary amendment was filed with this application on January 23, 2006, whereby the claims were amended to remove all instances of multiple claim dependency. Entry of the preliminary amendment is respectfully requested. The entry of the preliminary amendment obviates the objections to the claims. Withdrawal of the objections to the claims is requested.

If the preliminary amendment of January 23, 2006, can not be located, the Examiner is respectfully requested to contact the undersigned so that a copy thereof along with the filing receipt therefor can be submitted.

The prior art rejections

In paragraph 5 of the Office Action, claims 1 – 2, 4 and 6 – 16 are rejected under 35 U.S.C. 103(a) as being unpatentable (obvious) over Kawai et al in view of Koike. In paragraph 6 of the Office Action, claims 1 – 16 are rejected under 35 U.S.C. 103(a) as being unpatentable (obvious) over Takase et al in view of Koike. Both of these rejections are untenable and should be withdrawn, as is explained below in detail.

Kawai et al and Takase et al are cited as disclosing tricyclo[5.2.1.0.2,6]deca-8-yl(meth)acrylate and the corresponding decyl and decenyl acrylate. However, as the Examiner recognizes, neither of these primary references suggests or teaches deuteration of these tricyclo acrylates. As clearly pointed out in generic claim 1 and in generic claim 12, a significant feature of the present invention resides in that at least one hydrogen in the condensed ring moiety R⁴ of the generic claims is replaced with a heavy hydrogen atom. By employing the claimed monomer of claim 1, it is possible to provide polymers and optical members containing the polymers exhibiting superior thermostability and transparency.

Koike et al suggests using a substance for polymerization in which the H atom of the C-H bond is replaced by a D atom, but in doing so, Koike et al only teaches the compound MMA-d8

as a specific deuterated compound. Further, Koike et al does not teach nor even mention any specific method for producing a substance MMA-d8.

Applicant respectfully submits that a method for producing the compound [1] of claim 1 wherein R⁴ is a condensed ring containing a norbornane ring and a C₅₋₇ hydrocarbon ring, with the condensed ring containing at least one heavy hydrogen atom, would not have been obvious to the skilled artisan at the time of making of the present invention. As a result, the compound of formula [1] could not have been obvious to the skilled artisan. As a result, all claims of the present application (all claims require the existence of compound [1]), are not obvious over the references and thus are patentable over the cited references.

Known deuterated monomers such as MMA-d8 are generally produced according to a hydrogen-deuterium exchange method. According to this known method, a compound having oxygen in its molecule is placed in an alkali solvent containing D₂O, and then hydrogen in the molecule is exchanged with deuterium around the molecule. An oxygen/carbon/hydrogen resonance is formed in the solvent; and hydrogen is easily released therefrom and replaced with deuterium present in the solvent. However, this oxygen/carbon/hydrogen resonance is not found in tricyclo[5.2.1.0.2,6]deca-8-yl(meth)acrylate or the like, so that the exchange of deuterium for hydrogen does not occur.

The Examiner is respectfully requested to review the Examples of the present application beginning at the middle of page 25 thereof. In the Referential Examples, deuteration of tricyclo[5.2.1.0^{2,6}]dec-3-en-8-ol and tricyclo[5.2.1.0^{2,6}]decane-8-ol was carried out in the presence of palladium carbon catalysis, and using these deuterated substances, the compound of the formula [1] is produced; see Example No. 1 at page 27 of the application. From the knowledge in the relevant art relating to the production of the MMA-d8 type compound at the time of the present invention, it is submitted that the skilled artisan would not have considered the production of the compound of formula [1] of claim 1 wherein the R⁴ group must contain at least one heavy hydrogen atom. It would not have been obvious to the skilled artisan to produce the claimed compound [1] at the time the present invention was made.

Furthermore, Kawai et al merely recites that tricyclo[5.2.1.0.2,6]deca-8-yl(meth)acrylate is prepared by carrying out an ester exchange reaction of the corresponding tricyclo[5.2.1.0.2,6]deca-8-ol with methyl methacrylate or acrylate, or by carrying out a condensation reaction of the 8-ol with methacrylic acid or the like. Out of the three documents

cited by the Examiner, the only disclosed deuterated substance is MMA-d8. Therefore, even if the skilled artisan did combine Kawai et al (or Takase et al) with Koike et al, and carried out an ester exchange reaction or a condensed reaction of tricyclo[5.2.1.0.2,6]deca-8-ol with MMA-d8 as described in Kawai et al, the resulting compound only contains hydrogen atoms of the methacrylic acid moiety replaced by heavy hydrogen atoms (corresponding to R¹, R² and R³ in formula [1] of claim 1) and not replacement in the R⁴ moiety of claim 1. There is no teaching or suggestion in the references as combined to replace hydrogen atoms in the condensed ring R⁴ of formula [1] of claim 1 with heavy hydrogen atoms. Therefore, for this additional reason, the combinations of references as cited herein could not have possibly led the skilled artisan to the present invention.

Neither Kawai et al or Takase et al suggests the improvements found in the present invention by having at least one heavy hydrogen atom in the condensed ring. As described in the primary references, the introduction of the condensed ring into the side chains of a polymer is advantageous in terms of thermostability. However, the condensed ring contains a lot of C-H bonds (many more than in the remainder of the molecule) and this is disadvantageous in terms of transmission loss. For example, the condensed ring of norbornane with pentane provides 15 C-H bonds, while the total number of C-H bonds in the remainder of the molecule is not larger than 5. By replacing at least one of the hydrogen atoms in the condensed ring with heavy hydrogen, as compared with only replacing the hydrogen atoms in R¹-R³ with heavy hydrogen atoms, Applicant provides optical polymers and members having both improved thermostability and transmission loss, which would not be understood from any of the references of record.

Finally, it can also be appreciated that the present invention is superior to the products of the prior art from the data of Fig. 1 of the Drawing and the Tg of PMMA-d8. First, in this regard, Example Nos. 5 and 6 (page 29 of the application) can be directly compared with Comparative Example No. 1 (bottom of page 29) of the present application, with the test data therefrom being set forth in Fig. 1 of the Drawing. The polymer rods of Examples 5 and 6 contain the deuterated compound of the present invention while the comparative example contains the corresponding non-deuterated compound of the primary references. From Fig. 1, the polymer rods of the present invention, made of the compound of formula [1] of claim 1 copolymerized with heavy-hydrogenated methyl methacrylate, had a much smaller absorption attributed to the fourth C-H overtone at about 730nm or about 910nm compared with the

polymer of Comparative Example No. 1, which was prepared by polymerization of a compound representative of the primary references and having 0% heavy-hydrogenation content. Turning to Koike et al, it can be said that Tg of a polymer provides an indication of its thermostability; and, considering that Tg of a homopolymer of the present invention is around 154 degrees C and Tg of PMMA-d8 is 105 degrees C, it is understood that the present invention is significantly superior in terms of thermostability compared with the invention of Koike et al.

For all of the above reasons, it is clear that the present claims could never be considered obvious over the references as combined by the Examiner. The applied combinations of references can not lead the skilled artisan to the compound of formula [1] wherein the condensed ring R⁴ has at least one heavy hydrogen atom. In the absence of such a suggestion or teaching in the art, the present claims are patentable. The lack of a relevant disclosure on how to make compound [1], coupled with the comparative information discussed herein, further supports Applicant's position. Early indication of allowabilty is respectfully requested.

Conclusion

Reconsideration and allowance are respectfully requested. If any minor points remain for consideration, the Examiner is requested to contact the undersigned at the below-listed phone number.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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